CATALOGUE

OF

A SERIES OF SPECIMENS

IN THE

BRITISH MUSEUM (NATURAL HISTORY)

ILLUSTRATIVE OF THE MORE COMMON FORMS OF

NATIVE SILICA.

ARRANGED AND DESCRIBED BY

JOHN RUSKIN, F.G.S.,

HONORARY STUDENT OF CHRIST CHURCH, HONORARY FELLOW OF CORPUS CHRISTI COLLEGE, AND SLADE PROFESSOR OF FINE ART, OXFORD.

GEORGE ALLEN,
SUNNYSIDE, ORPINGTON, KENT.
1884.

CATALOGUE

OF SELECTED EXAMPLES

OF

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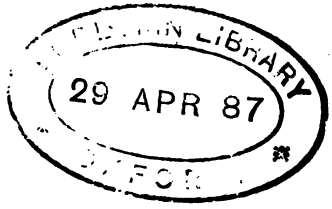

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PREFACE.

THIS series of specimens has been selected to illustrate the more frequent varieties of Native Silica. One of these, quartz, is the most common of minerals; it is almost the only component of most gravels, sands, and sandstones, while it enters largely into the composition of many of the metamorphic schists and crystalline rocks: others, as flint and jasper, though not so plentiful, are still important constituents of the earth's crust; while chalcedony, the principal substance of agates, from early periods has been an important material in the arts. These varieties are in most works on mineralogy treated as accidental conditions of one and the

same substance. But they are in this carefully chosen series exhibited in their essential distinctions, and their gradated phases of connecting state; and they may be studied in these generally occurring forms with the greater facility, because all those siliceous minerals have been excluded which appear to have been produced by narrowly local circumstances. Thus chalcedony involved in bitumen found in Auvergne, and nearly all the forms of opal, including hyalite and cacholong, must be looked for in their proper places in the great gallery; few minerals being shown in this selected series but those which, though here seen in their finest conditions, are in their less striking forms of frequent occurrence, and of extreme importance in the structure and economy of the world.

The authorities of the Museum are not responsible for any speculative statement or suggestion made in the following catalogue, but the description of each specimen has been submitted for modification or correction, and may, therefore, be received

with perfect confidence; while, on my own part, the attention which I have given to this department of mineralogy for upwards of fifty years may, I think, justify me in claiming the reader's attention to statements which may at first seem to him, on the mere evidence presented in this single series, daring, or even indefensible. He may, at least, rest assured that they are in no case prompted by the desire of gaining credit for originality; my conviction being that there is nothing in my views on the subject of siliceous construction which may not be found already formalized by mineralogists of the last century.

A considerable number of the specimens here described have been presented to the Museum out of my own chosen examples at Brantwood (or, in some instances, directly purchased by me for this series), in order to fill gaps in its order which could not be supplied from the National collection without loss to the beauty and completeness of the series in the great gallery. The pieces numbered **7, 20, 21, 24, 28, 38, 52,**

80, 90, 91, 95, 97, 98, 101, 103, 104, 116, 117, 118, 126, may be particularized, but it may perhaps be permitted me to suggest that the names of donors should be merely registered in the historical account of the British Museum and its collections, and should cease to encumber either the cases, or the scientific guides to them.

JOHN RUSKIN.

BRANTWOOD,
August 1st, 1884.

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1 Common nodular flint, showing the distinctly concentric structure of many so-called flint 'pebbles.' The term 'pebble' should always be restricted to those produced by friction on beaches or in streams; whereas, in this example (as also in all cases of amygdaloidal agate concretion), the form of the stone is owing either to its own manner of coagulating or crystallizing, or to the shape of the cavity it was formed in. This example is curious only in the demonstration of its structure by a loose smaller nodule in the middle.

Part of the surface is artificially polished; the rest reticulated, like that of nearly all flint pebbles, rolled or not, (compare my F. 1 at Sheffield), the reticulation being structural and not due to impact.

2 Common branchiate flint.

In its secretion from chalk, flint often assumes very strange branching or even bone-like forms, quite distinct from those of all other minerals. This is a small but interesting type. (Isle of Wight.)

Allan-Greg Collection, 1860.

3 Black flint; banded; extremely fine specimen. This banding is the first and rudest condition of agatescent structure. See the paper on the subject in the *Geological Magazine*, Vol. I., 1864, p. 145, by Mr. S. P. Woodward, who was the first to explain the structure. (Banks of the River Samara, Russia.)

Presented by Count Apollos de Moussin Poushkin.

4 Common flint, coarsely amygdaloidal, determining itself (primarily?) into zones parallel to its surface, and (secondarily?) into porous white or grey cloudings, tending to apparent brecciation. Very characteristic. (Basel.)

5 Common flint, coated with a thin film of blue chalcedony; determining itself (by alteration?) into white zones, transverse to the coating; but changing its colour only, not its structure, the alteration seeming in places to be arrested by the minute fissures. Beautiful.

This example is put side by side with Nos. **11** and **19**, to show the general types of nascent flint-chalcedony. (Croydon.)

Purchased, 1861.

6 Sausage-shaped nodule of flint, replacing the stem of a sponge. Coated with chalcedonic film. (English.)

7 Almond of pure chalcedony enclosed in flint. Unique, in my experience. For comparison with Nos. **1**, **5**, and **6**. (English.)

8 Flint altered by contact with basalt: red and in flaky disintegration, passing into an amorphous white mass, like the exterior of a common flint. There may, perhaps, be some clue in this rude example to the processes at work on fine material in No. **15**. (Antrim).

Allan-Greg Collection, 1860.

The first seven specimens are all white or black, or greyish blue. This one introduces the

question of the red colour of jasper, and of the level bedding of lake-agate.

9 White jasper, passing into beautifully banded brick-coloured jasper; exquisitely spotted, as the latter also, with dendritic oxide of manganese, of microscopic delicacy; the mass, here and there, retreating to form cells filled with bluish chalcedony, transitional to quartz, while at the outside it is in some parts brecciate to extreme minuteness: on one side is a little of the melaphyre, in a cavity of which it was formed.

Very lovely, but not to be seen in its full beauty without a lens.* (Oberstein.)

10 Rounded pebble of white jasper, in flammeate and writhed bands, exactly intermediate between the bands of flint and those of folded agate. Stained in centre by oxide of iron like Nos. **8** and **9**. Superb.

11 Small stalactitic chalcedony in flint. Very pretty. (Sussex.)

Mantell Collection.

12 Almond-shaped flint pebble, probably dropped out of such a rock as No. **31**, and showing the outer

* These tantalizing statements are of course only made to direct the student in the examination of similar specimens elsewhere.

yellow band which resulted either from its contact with the matrix or the action of water, or weather, when the pebble was loose. (Subsequently ?) banded with bands extending to the surface.

13 Small nodule of finely-zoned agate, showing very remarkable fractures. (Scotland.)

14 Agate. Salmon colour ; amygdaloidal, small, compact, and of extreme fineness, showing orbicular concretion at the exterior and a nucleus of exquisitely levelled beds of two orders. (Scotland.)

Many of these small nodules out of the Scottish trap are inestimable in exhibition of fine siliceous structure.

Presented by Benjamin Bright, Esq., 1873.

15 Egyptian jasper, faulted, for comparison with other examples of definite fault. Whether actually shifted, or independently banded on opposite sides of the vein, is for the present, to me, questionable. (Near Cairo.)

16 Red, or dark subdued crimson, jasper, arranging itself in eddied bands, which look faulted in their sudden undulation, traversed by others less distinct and transverse, which will be seen under the lens to be distinctly brecciate at one part

of the stone, giving one of the most subtle examples of incipient brecciation. (Urals.)

17 Portion of a vein of irregularly banded pink jasper, with traversing ferruginous stains. Fine; but at the back, showing straight divisions across the beds. (Urals.)

18 Flint formed round sponge and passing into recumbent chalcedony, a kind of pebble extremely common on the beaches of the south coast of England (out of the greensand formation?) (Sussex.)

19 Common chalk flint, with spongiform chalcedony replacing sponge partially filling the interior hollow. A fragment of an Echinus with a small attached serpula at one extremity is on the outside. (Near Croydon.)

Purchased, 1861.

20 and **21** Pudding-stone, so called, but I believe concretionary. The upper surface of **21** shows at one extremity, new 'pebbles' forming in the old ones. (Hertfordshire.)

22 Fragmentary flint, in siliceous paste.

23 Common fragmentary natural mosaic, seemingly formed by contraction of yellow jasper, leaving

fissures like those in drying clay, afterwards filled by siliceous paste. Compare note on No. **30.**

24 Flint passing into jasper, seemingly brecciate. This material forms huge masses of the coast-rocks at Sidmouth, and the low stone walls of the fields are mostly built of it. Conf. **37.**

25 Block of pure yellow mossy jasper, passing into reddish-brown chalcedony, in some parts tinged with purple. The form associated with sponge flints, the veins of chalcedony isolating portions of paler jasper. (Ekaterinburg, Russia.)

Presented by Count Apollos de Moussin Poushkin.

26 Common flint, apparently crushed and recemented; but the structure has never been properly studied, and is in some of its conditions at present inexplicable. Cut and polished under my own direction.

27 Pink opal, exhibiting resemblances of brecciation. (Quincy, near Bourges.)

28 Chalcedonic flint, confused in aspect between a breccia and a conglomerate: and stained (by iron oxide?) of the most brilliant scarlet I ever saw in the material.

29 Yellow opaque ferruginous silica, enclosing fragments of crystallized quartz, and traversed at one side by irregular veins of grey chalcedony. (Zweibrücken.)

Beroldingen Collection, 1816.

30 Chalcedony in horizontal layers of slightly varying substance, passing by irregular alteration into opaque conditions, first yellow, then white, which must be carefully distinguished from true white jasper. Seen on the polished surface, they seem to be partly related to the fissures caused by contraction during (desiccation ?). (Faroe Islands.)

31 Boulder rock of the southern drift, (slice of,) presenting the most interesting phenomena of siliceous pebble-beds. (Hertfordshire.)

32 Jasper, an enormous nodule in three bands, grey, purple, and paler purple, round a sandy nucleus : the grey band becoming brown at its exterior ; and the entire mass determining itself into incipiently porphyritic conditions. At one point the grey band gathers into small spiral or shell-like forms.

Wonderfully interesting. Presented by Sir Richard Owen, who brought it from Cairo.

33 Purple chalcedony, coating quartz ; only noticeable for its fine colour. (Near St. Austell ?)

Purchased, 1856.

34 Purple chalcedony in lifted crusts, associated with chlorite and cassiterite.

Very singular, though scarcely seeming so at first glance. (Wheal Maudlin, Lanlivery, Cornwall.)

Purchased, 1851.

35 Common flint-chalcedony, the external iron-stain more delicately applied, and the pores of the chalcedonic crust very peculiar. (Flonheim, Hesse.)

Beroldingen Collection, 1816.

The three examples **33** to **35** show the most beautiful purple colours reached by common flint-chalcedony. They are always a little more rusty or red than the more delicate bloom of the purer varieties of opaque-surfaced chalcedony.

36 Grey flint-chalcedony of the south coast, with spongy or mossy ochreous secretions.

37 Part of No. **24.**

38 Common red flint-chalcedony, richly developed in the hollow of a flint.

39 Chalcedony in crusts, with emergent or inflowing stalactites. (Aden ?)

40 Another variety of the same state. (Aden ?)

Both **39** and **40** presented by the Hon. Robert Marsham, 1877.

41 and **42** Examples of chalcedonic "nuts" formed in trap rocks.

The former in diabase from Montrose, the latter in basalt from Co. Derry: both presented by Benjamin Bright, Esq., 1873.

43 Lake-chalcedony traversed by chloritic filaments.

44 Another example,—both singularly fine.

45 Slice of a large block of lake-chalcedony, with dispersed chlorite.

46 Chalcedony with inclined stalactites, like **39** and **40.** (Iceland.)

47 Brown compactly-knitted chalcedony; very rare.

48 Black recumbent chalcedony. (Redruth.)

Purchased, 1859.

49 Chalcedony associated with chrysoprase. (Baumgarten.)

Aylesford Collection.

50 White flint-chalcedony in crusts; wonderful. The separation by crevasses, apparently opening gradually, of chalcedonic films and crusts in this grand specimen, is a structure peculiar to flint chalcedony. It never occurs in true agates.

51 Portion of a nodule of lake-chalcedony in which opaque white masses are separated by clear currents which, one by one, join an increasing current descending at the side. Unique, so far as I know, in this resemblance to a river and its tributaries. (Faroe Islands.)

Allan-Greg Collection, 1860.

52 A larger slice from the centre of the same nodule, formerly one of the most valued pieces in my own collection.

53 Common lake-chalcedony of Iceland, in level beds, traversed by stalactitic tubular layers. The museum is curiously poor in specimens of this character: but the surface of the single tube, seen in the polished section, is of extreme beauty.

Beroldingen Collection, 1816.

54 Chalcedony in beds evidently shattered and faulted, afterwards recemented, with a kind of ripple mark instead of their natural reniform structure, on their external surfaces. The most

wonderful and inexplicable piece I ever saw.

Allan-Greg Collection, 1860.

55 Chalcedonic geode, traversed by straight beds or laminæ of fine chalcedony, with separating cavities which have the aspect of moulds of tabular crystals now fallen out or dissolved. "The only one I have seen with these impressions" (W. G. L.).

Looked at from the interior cavity of the geode, the separate mass round the great laminar impression has the common look of a crust on a tabular crystal. (Dept. of Salto, Uruguay.)

Presented by W. G. Lettsom, Esq., 1863.

56 Chalcedony. Pseudomorph, after calcite? Note in the interior of its cavity the enclosed laminæ with oblique terminations. Superb. (Uruguay.)

Presented by W. G. Lettsom, Esq., 1877.

57 Common grey flint, or semi-flint, passing into opaque blue semi-chalcedony, forming a cell, lined with pure common chalcedony half an inch thick, across which cell are formed one single and two conjunct cylinders of solid chalcedony, the conjunct one terminated spherically as usual, but the single one simply traversing the cell. (English.)

Not easily to be matched in its strangeness and simplicity.

58 Confluent recumbent chalcedony. (Iceland.)
Purchased, 1837.

59 Geode of chalcedony, very large, with vertical stalactites of the same material as its walls. Superb. (Iceland.)

60 Flamboyant* black chalcedony on crystallized quartz, magnificent. (Pednandrea mines, near Redruth.)
Purchased, 1868.

61 Chalcedony in a level field, with rods irregularly recumbent on it, each apparently composed of two segments soldered together, and forming sometimes an extremely sharp ridge at the junction. Very curious. With groups of yellow dolomite crystals.

62 Blue chalcedony in vertical walls and rods, each of the latter having a minute central rod of iron-oxide; in a cavity of iron-oxide. Beautiful. (Ruskowa, Hungary.)

63 Chalcedony in vertical stalactites dependent from a thin crust of the same material; each enclosing mossy filaments of chlorite, and coated with small crystals of quartz. Very beautiful.

64 Mural chalcedony, that is to say, chalcedony in

* I take leave to use this word as best descriptive of these forms, peculiar to chalcedony, though sometimes partially imitated in Aragonite and a few other minerals when obscurely crystalline.

which the rods or other reniform processes collect laterally into walls or tablets of a fairly uniform thickness. On the grandest scale.
Purchased, 1851.

65 Fine white chalcedony, in crusts of extreme delicacy, developing themselves into groups of straight rods, which in places distinctly affect a trigonal arrangement; of extreme beauty and rarity, yet in its encrusted structure having something in common with the ordinary spongiform states like those of No. **19**. (Guanaxuato, Mexico.)
Heuland Collection.

66 Chalcedony, common gray, in prostrate rods formed of globules adherent round a fine thread of some central substance. (Faroe Islands.)

67 Chalcedony in spiral whorls, encrusted with crystals of quartz, partially filling a cavity in a slate veinstone containing dispersed copper pyrites and dolomite. Superb. (Cornwall.)
Purchased, 1851.

68 Recumbent rod-chalcedony, fine, but much injured by fracture. (Trevascus mine, Cornwall.)
Greville Collection, 1810.

69 Portion of a geode of amethystine quartz coated by brown chalcedony. (Oberstein.)
Greville Collection, 1810.

70 Dove-coloured flamboyant chalcedony, on quartz. Loveliest form of this mineral. Trevascus mine, Cornwall.

71 White flamboyant chalcedony, of unique beauty on quartz. Trevascus mine, Cornwall.
Greville Collection, 1810.

72 Another portion of the geode, No. **69**, partly filled by flammeate chalcedony. Unequalled, I believe, in Europe.

73 Heliotrope, pisolitic; though not easily seen to be so: with quartz, semi-crystalline, forming an agatescent series of irregular bands in the centre of an amorphous mass. (Banda, India.)
Purchased, 1867.

74 Jasper, dull red and green, obscurely banded, with pale brown orbicular concretions, ugly, but very instructive in their method of formation. (Isle of Rum.)

75 Heliotrope, in riband beds, with two elongated white spaces formed by minute quartz. The mass of it shown on the rough edge to be minutely pisolitic. Extremely fine. (Banda, India.)
Purchased, 1865.

76 Heliotrope, the red forming a compact and

united mass, in the middle of which are finely agatescent bands of blue chalcedony round a small cavity. (Banda, India.)

Heuland Collection.

77 Heliotrope, indistinctly pisolitic in the manner of No. **73**, but having the quite opaque portions subdivided by a spongy structure of microscopic fineness. This structure, however, exists, though less apparently, both in **73** and **75**. (Banda, India.)

Purchased, 1882.

78 Heliotrope, pisolitic, extremely clear and fine, and of unusual size. The slab is 5 inches long by $3\frac{1}{4}$ inches wide. (Banda, India.)

79 Heliotrope, distinctly pisolitic in the green mass, leaving the white spots in the form of a paste, filling the cavities between the spheres. (Banda, India.)

Purchased, 1882.

80 Heliotrope, massive, partly degenerating into chert or flint; divided by broad veins of chalcedony and milky quartz, in which it is to be observed that the layers are arranged differently on opposite sides of the vein.

Splendid, and peculiarly illustrative of veined structure. (Banda, India.)

81 Agate in grand mass, of the fine beds usually found at Kunnersdorf in Saxony brecciate or inlaid,* here in the order of their lines; locally faulted, but not consistently—*i.e.*, the faults not going through all the beds. Of consummate interest. (Kunnersdorf.)

82 Brown, yellow, and purple agate, the purple space developing across the concentric beds. Wonderful.

83 Oval slab of amethystine agate, exactly in the transitional state between common amethystine quartz-rock and inlaid agate. A perfect and marvellous type of incipient inlaying.
Purchased, 1882.

84 Exquisitely delicate amethystine inlaid agate, containing hollows with peculiar surfaces. (Kunnersdorf.)

85 Inlaid agate, amethystine, finest kind. The spot of quartz developed in the midst of the white banded bed is very rare. (Kunnersdorf.)

86 Jasperine agate, the form of the first layers being that of the crystals of quartz, partly amethystine,

* I shall in general use the term 'inlaid' of stones consisting of apparent fragments imbedded in a crystalline matrix, respecting which I am in doubt if the fragments be really broken or not. The term 'inlaid' is descriptive, and involves no theory.

upon which they are based. Magnificent. (Kunnersdorf.)

Purchased, 1883.

87 Agate, a portion of an amygdaloidal nodule with jasperine bands of exquisite beauty, illustrating nearly every phenomenon of folding, and crystalline interference. The minute cones of quartz locally traceable with a lens along the white, and the finely-veined innermost bed, exactly *like* tents of a camp in the desert, are *extremely* rare ; but the most peculiar feature in the stone is the jagged red crystalline formation filled up with spotted white, on its lower side* (left hand of spectator), totally absent on the other side. (Oberstein.)

Presented by Benjamin Bright, Esq., 1873.

88 Inlaid agate on the grandest scale : superb. (Kunnersdorf.)

Purchased, 1883.

89 Inlaid agate, a thin slab, polished on both sides. The most interesting piece of faulted bedding I ever saw. (Kunnersdorf.)

Bequeathed by the Rev. C. M. Cracherode, 1799.

* In all cases when agates are convex on one side and flat on the other, it may be assumed with probability that the flat side was the bottom.

90 Jasperine agate developing transverse bands. Wonderful.

91 Inlaid agate, consisting of opaque shell-like bands, imbedded in pure chalcedony; part of a rolled pebble from the east coast. Unique in my experience.

92 Jasper, in concentric bands, apparently determined by hæmatite. Unique in my experience.

93 Reddish-brown 'semiopal,' in singularly-faulted beds.

94 Jasper, deep red, in beds, more or less faulted and distorted, the interstices filled by milk-white quartz and chalcedony, and the whole seeming to form a vein in a chloritic rock. (India.)
Purchased, 1874.

95 Jasper, in beds arranged at more or less sharp angles.

96 Red mural agate.

97 Inlaid agate, with the zones in some places continuous round the apparent fragments. The most interesting piece I ever saw.

98 Mural agate, in crossing plates and walls. Unique.

99 Inlaid agate, divided by straight fissures, the beds

concurrent on opposite sides. Superb. (Kunnersdorf.)

100 Inlaid agate, with portions of involved calcite. Wonderful.

101 Agate in perfect development by two steps only out of compact silica. Unique in my experience. It will be seen that there are two states of chalcedonic secretion, one traversed by irregular traces of fissure—the other zoned.

102 Agate feebly zoned, but of beautiful substance, developed in a mass with precise edges, almost rectilinear in the section, out of a mixture of dolomite and chalcedony. Unique also in my experience, though in nearer relation to known structures than No. **101.**

103 Conchoidal agate; so called by me on first describing it, from its resemblance to fragments of shells, by which certainly some varieties have been produced. (Oberstein.)

104 and **105** Two pieces of an agate developing itself by writhed contraction out of white semiopal.

106 Grey agate, stalactitic, in part, and partly crystalline. Very wonderful. (Wheal Friendship, Tavistock.)

Sloane Collection, 1753.

107 Common lake-agate (artificially stained), with hollow in centre. (Uruguay.)
By exchange, 1863.

108 Common lake-agate, with its centre filled. (Uruguay.)
Purchased, 1874.

109 Oval-domed agate, with lifted lake-bed. Superb. (Uruguay.)

110 Folded agate, involving a small tabular agate in its outer layer.

111 Half of a nodule of extremely interesting lake-agate; its level beds twice interrupted by elevations towards the left hand, as it now lies. (Uruguay.)

112 Lake-agate, not nodular, but of irregular external form. (Uruguay.)

113 Agate, amygdaloidal with (pendant ?) stalactites of chalcedony, filling the upper part of its cavity, the rest being occupied by quartz, while the base is composed of a ragged. jasperine concretion, presumably related to the condition especially indicated in No. **87**. (Scotland.)
Presented by Benjamin Bright, Esq., 1873.

114 Chalcedony, common, massive, in extremely flat reniform concretion, and drawn into quite mar-

vellous complexity of irregularly bent and involved zones, formed apparently by a new development of structure, more or less following the original larger zones. (Uruguay.)

Purchased, 1872.

115 Larger portion of a divided nodule of folded agate; the best example of the structure I ever saw.

Purchased, 1872.

116 and **117** Parts of a large nodule of rock-crystal, the summits of the individual crystals being directed inwards; the central cavity afterwards filled with a bluish-white agate, of which the bands follow the contours of the crystals.

118 Small white sparkling quartz crystals grouped so as to form recumbent and intermingled rods, an extremely beautiful example of a very unusual structure.

119 Hemisphere of quartz formed by radiating crystals, of which the projecting summits are remarkable for a peculiar play of colour. (India.)

120 A clear tapering rock-crystal, with the usual striations on its faces.

By exchange, 1868.

121 A strange sheaf-like group of amethystine-tinged crystals, with three-sided summits, resting on

a base of chalcedony: the lesser individuals of the upper part of the sheaf are all nearly parallel to the central large one. (Elba?)

By purchase, 1870.

122 A group of several large white crystals, each of them compound, and analogous in structure to **121**, but having a more simple summit with six sides: with adherent chalybite (carbonate of iron). (Virtuous Lady mine, near Tavistock.)

Purchased, 1870.

123 Rock-crystal enclosing long slender crystals of rutile, some of them showing the characteristic red colour, and also some mica.

Sloane Collection, 1753.

124 A curious specimen of rock-crystal, with remarkable striations: at first sight the shape of the specimen appears to be due to fracture, but closer examination reveals the crystalline faces on the edges. (La Gardette, Dauphiny.)

Purchased, 1837.

125 A clear transparent rock-crystal with peculiar impressions. (Savoy.)

126 A group of crystals illustrating a previous stage in their growth by the enclosed foreign matter

which has been deposited on the faces of the earlier individuals.

127 A remarkable growth of crystals disposed parallel to each other in such a way as to indicate an approach to a single compound crystal: the jagged saw-like individuals, lengthened parallel to an edge formed by the meeting of a pyramid-face with a prism-face, are very noteworthy.

Sloane Collection, 1753.

128 Very similar to **127** in structure, but the resulting individual more complete: enclosed layers of foreign matter, arranged parallel to the faces of the crystal, again illustrate a previous stage of growth.

129 Rock-crystal enclosing thick and thin crystals of rutile.

Sloane Collection, 1753.

130 Beautifully clear rock-crystal, enclosing moulds due to four-sided prisms, and tabular crystals or fragments, of some mineral since removed. (Brazil.)

Heuland Collection.

131 Rock-crystal enclosing chlorite, with pink and brown

altered conditions of the same mineral. (Minas Geraes, Brazil.)

Purchased, 1838.

132 A large fragment of rock-crystal with vermicular chlorite dispersed throughout its mass, and some small plates of hæmatite: beautifully iridescent: (Brazil.)

133 Probably a portion of **132** (see farther observations on this, and the following specimen, in the postscript, p. 26).

134 A large polished slab of green avanturine-quartz. (India.)

Presented by Colonel C. S. Guthrie, 1865.

FINIS.

POSTSCRIPT.

THE manner in which No. **132** is placed and levelled permits the spectator, standing between it and the window, to see by vivid reflection its splendid iridescence. In quartz this iridescence is always owing to irregular fissures with close surfaces,—*flaws*, that is to say, in parts of the stone, and not conditions of its proper structure. In the varieties of Felspar known as Labradorite and Moonstone, various colours are structurally reflected from different parts of the stone, or a pale blue light from the whole of it, but there is no opalescent interchange of hues anywhere. On the contrary, in opal, the cause of the colours pervades the whole structure of the stone, and opal is not perfect opal unless it is iridescent *throughout:* there is a difference, too, in the spectrum of the colours reflected from those given by fissured crystal, which is as yet a matter of unexplained mystery, and will always be one of extreme interest.

Specimen No. **119**, in which the exterior surfaces of the radiating quartz crystals are opalescent, is (hitherto) unique. They are truly *opalescent*, not merely splendent in the manner of No. **132**, and they enable the observer at once to recognize the essential difference between the colour-tones of opal and of fissured quartz. The colours of opal are always of a subdued tone, and of perfect purity,—no mixture of hue ever takes place which dulls or corrupts; but in fissured quartz the colours are unsubdued, being only those obtainable in the common spectrum of the prism; and the colours are often blended so as to detract from each other's purity, and give coppery or bronzed combinations of red and green, which would never be allowed by a good painter; while the blue chiefly reflected by quartz is only that which is produced by the pigments formed of prussiate of iron, the blues reflected by opal are, on the contrary, always those produced by smalt and ultramarine.

I need not insist on the singularity of this distinction in hues of reflected light which are absolutely unaffected by coloured chemical elements in the substances exhibiting them, and are produced only by different structures in clear, or translucent, silica.

It is true that a certain quantity of water is always engaged in, or combined with, opal, while

there is none in compact (it is possible there may be sometimes in fissured) quartz. But, singularly, in hydrophane opal, of which the colours are greatly increased in power by the absorption of water on immersion, what the colours gain in power they lose in purity, and the hues of dipped hydrophane are vulgarized down to almost the level of those of quartz.

I would also direct the observer's attention, in the beautiful specimen **132**, to the form of the contained chlorite, described as 'vermicular.' Chlorite, which ought to be more simply termed 'Greenite' or 'Greeny,' is a combination of silica, alumina, magnesia, protoxide of iron, and water, in approximately the proportions of **25, 20, 20, 25, 10,** in the hundred parts, or in this altered order easily memorable.

Silica,	Alumina,	Water,	Magnesia,	Iron.
25	20	10	20	25

And worth memory, for chlorite is the colouring matter of almost innumerable varieties of green stone. It is extremely desirable that mineralogists should distinguish in all catalogues the silicas coloured by, or involved with, this mineral, from the numerous conditions of heliotrope and agate in which the green may be owing to other constituents.

I may permit myself, in conclusion, to observe that the stones in this case having been all placed so as both to exhibit their peculiarities with distinctness, and to admit of convenient comparison with each other, where comparison was desirable, I have hope that their present order may be a permanent one; and perhaps lead to similar arrangements of other groups in which perfect exhibition of character is more desirable than multiplication of examples or consistency of theoretical system. In a museum intended primarily for the instruction of the general public, it is not of the least consequence whether silicates come after carbonates or oxides after sulphides: but it is of vital and supreme importance that specimens whose beauty is in their colour should be put in good light, and specimens whose structure is minute, where they can be seen with distinctness.

J. R.